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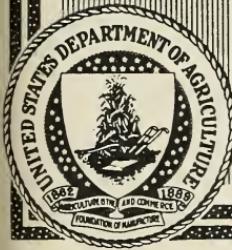
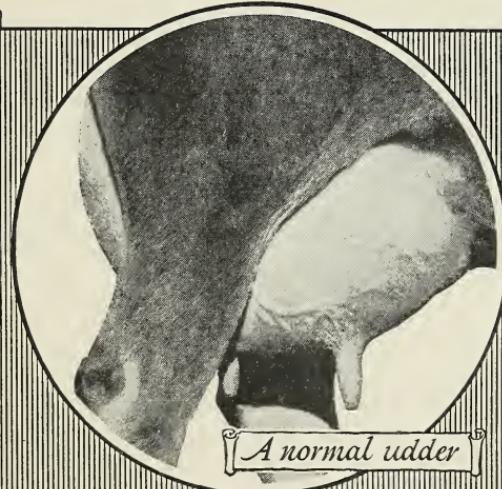
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U.S. Department of Agriculture

# U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1422 *rev.*  
*Mar. 1941*

## UDDER DISEASES *of* DAIRY COWS



## **T**HE MAINTENANCE of healthy cows with normal udders is of vital importance to the dairy industry.

A cow that is healthy in every other respect but has a diseased or nonproducing udder is worthless in a dairy herd. The prevention and treatment of the diseases which bring about this condition are discussed in this bulletin. The limitations of a bulletin of this kind preclude anything more than a brief discussion of each disease and a suggested line of simple treatment adapted to the means and conditions of the average dairyman.

This bulletin is in no sense intended to replace the valuable services of the veterinarian, which, if available, should by all means be obtained.

An effort has been made to avoid fine distinctions and technical language in the hope that the information may better supply the widespread need for a practical and popular discussion of the subject.

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Washington, D. C.

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# UDDER DISEASES OF DAIRY COWS

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## CHARACTERISTICS OF THE UDDER

A FUNDAMENTAL axiom of horse husbandry is well expressed in the statement "A horse is no better than his four feet." Translated into terms of dairy husbandry, it would sound much like this: "A dairy cow is no better than the four quarters of her udder."

Implied or expressed, this rule largely governs the desirability of animals considered for a dairy herd or the fitness of any animal to remain in the herd. The attention of the stock judge is focused on the udder conformation as a guide to a cow's excellence, and the dairyman ultimately rates her value to him according to the evidence of the milk sheets and the butterfat test.

The dairy cow's udder (fig. 1) is a highly developed gland, the result of centuries of careful, selective breeding. It is complex in its structure and physiology. Functioning as it does, under high tension, for maximum milk production during most of the adult life of the cow the udder is subjected to very great physical strain, with small opportunity for rest or repair. The extra tax on the udder which is involved in the birth of calves and prolonged milk production often counterbalances the rest allowed between lactation periods.

The great development of this organ and its complexity are factors which render most difficult the treatment of abnormal conditions of the udder of the dairy cow. All things considered, it is always advisable, when a disease or injury is observed, to undertake treatment only under the advice of a veterinarian.

## PREVENTION OF DISEASES AND INJURIES

Many of the udder conditions which frequently occur in the dairy cow are avoidable. Deviation from regular and established practice in the care of the animal is the frequent forerunner of serious

consequences. Lack of care in the use and cleansing of milking machines,<sup>1</sup> teat dilators, and milk tubes may result in permanent injury of one or more quarters of the udder. Brier cuts, barbed-wire cuts, and bruising or crushing of the teats by other cattle stepping on them (often due to bad stall construction) are usually avoidable. These injuries may lead to leaky quarters, fistulous teats, mastitis, and other troubles, and possibly to loss of function. Udder troubles of cows are sometimes directly or indirectly traceable to rough treatment by attendants who in driving the animals to and from pasture, stone them or beat them with sticks, clubs, or whips. Horned animals

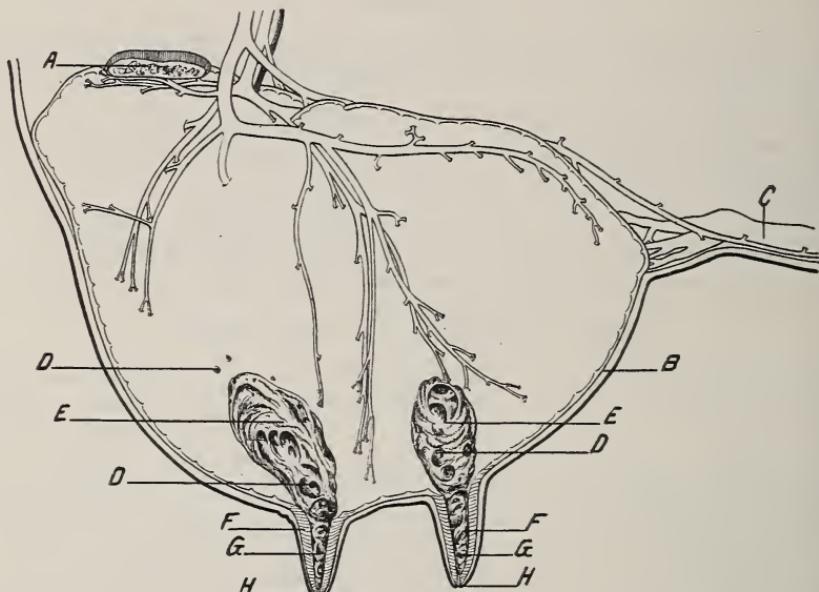


FIGURE 1.—Diagram of one-half of the udder of the cow (adapted from H. C. Wilkie): *A*, Supramammary lymph gland (in section); *B*, skin; *C*, subcutaneous abdominal vein (milk vein); *D*, openings of the milk ducts, of which there are a very large number opening into the milk cisterns; *E*, milk cisterns; *F*, walls of the teats; *G*, interior of the teats; *H*, orifice or opening of the teat.

also inflict injury on their fellows, which may involve the udder as well as other parts of their bodies.

### DRYING OFF THE COW

Long experience has shown that heavy-milking cows are more productive if allowed a resting period of from 6 to 8 weeks before calving.

Damage may result from attempting to dry off a cow too suddenly before calving, especially when the animal is on succulent pasture or a rich, concentrated ration. In some cows the propensity for milk production is so highly developed that the function seems difficult to repress even during advanced pregnancy, and efforts to terminate a milking period forcibly in such animals possibly do more harm than good.

<sup>1</sup> See Farmers' Bulletin 1315, Cleaning Milking Machines.

To dry off a cow, it is advisable first to regulate her ration. Supply well-cured hay in place of succulent pasture, silage, or beet pulp. By stages eliminate all concentrates, for at this time they tend to favor the continuance of milk production. Bran may be given alone or with some middlings. For about a week omit every third milking, and then milk once daily for another week, without stripping. Afterward it may suffice to milk only a few streams daily to relieve the tenseness of the udder.

Inflammation in one or more quarters at this time should be looked upon as evidence of chronic mastitis. When the milk secretion has subsided, no further attention will be required as a rule. This plan may be varied to suit individual cases, and some authorities advise drying off cows that give 20 pounds or less by merely ceasing to milk.

It sometimes happens that just before calving time the udder of the cow becomes greatly distended and may cause the animal pain owing to pressure, weight, and the stretching of the skin. In exceptional cases it may be necessary to relieve the condition by milking. Ordinarily, however, it is best not to meddle or interfere with this condition, which is a normal one. To milk the udder out at this stage is not desirable for at least two reasons: (1) It robs the calf of the first milk or colostrum, which nature has provided as a first laxative feed for the newborn offspring; and (2) it tends to predispose the cow to an attack of milk fever.

## SEPARATION OF COW AND CALF

Under ordinary conditions the cow should be removed from the calf not later than 24 hours after calving. In exceptional cases, it may be advisable to postpone this separation, but it should not be unduly delayed if injury to the udder is to be avoided. As a rule the calf will have received enough colostrum and attained sufficient strength to grow satisfactorily under the usual hand-feeding methods at the end of 24 hours. On the other hand the udder is subjected to more and more injury during nursing as the calf grows stronger if the dam is allowed to remain with it. The practice of permitting the calf to nurse as a means of breaking up congestion of the udder during an attack of mastitis after calving is a questionable one. It apparently serves no purpose that cannot be accomplished more satisfactorily by proper treatment with less damage to the udder and discomfort to the cow.

## VICES

Some calves acquire the habit of sucking the udders of other calves, a vice which should never be tolerated, despite the apparent harmlessness of it. The possibility of damage is twofold. In the first place it may tend to the formation of an ill-shaped and pendulous udder, and hence seriously detract from the beauty and value of the animal in afterlife. Furthermore, there is some danger that the heifer, especially if of well-bred dairy stock, may become stimulated to virgin milk secretion. In the course of events this milk secretion, the presence of which is not suspected, dries up of its own accord, without the necessary care on the part of the owner, and a ruined udder may result. To overcome the vice the milk ration of calves may be followed by a handful of grain fed before they are turned out. This tends to remove the desire to nurse.

Cows sometimes acquire the habit of sucking their own teats. While this practice may not harm the cows it is unprofitable for the owner.

There are several more or less effective ways of breaking cows of the

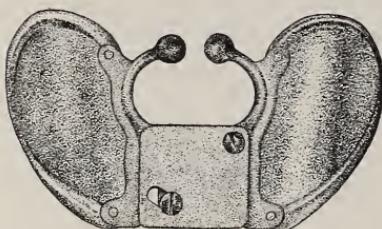


FIGURE 2.—A calf weaner. A device on the market for placing in the animal's nose.

habit of sucking their own udders or the udders of other cattle. Some herdsmen have used the common calf weaner (fig. 2), which is a small, bib-like attachment for the nose, or the muzzle-basket type of calf weaner (fig. 3), either of which contrivances is so arranged as not to interfere with eating or drinking, but covers the mouth when the head is slightly elevated. Others have resorted to the use of the spiked halter, which is made by perforating the muzzle strap of an ordinary leather halter at intervals of about 1 inch and passing sharpened wire nails through the holes, from within outward, lastly lining the barbed strap to hold the spikes in place. This method, however, borders on the barbarous and may be attended with danger to the wearer or to other stock in the same pasture. A crib, or rigid collar (fig. 4), is more humane, and may be made by lacing together a number of stout sticks in barrel-stave fashion, and tying them around the animal's neck, thus preventing her from bending sidewise and yet permitting her to graze. This apparatus is mainly effective for animals that rob their own udders. Another type of apparatus (fig. 5), which is effective in preventing a cow from robbing her own udder, consists of a halter, to the chin strap of which a stout stick is attached by means of a short chain. The stick is passed between the forelegs and is fastened at the other end by a large, metal ring to the lowest point of a girdle fitted comfortably around the animal's body.

If mechanical contrivances fail to correct the vice, the culprit may be isolated for a while, or, better still, pastured for a limited time daily under observation or isolation, immediately after milking, and then stanchioned for the rest of the time. After a few weeks of this manner of restraint she should manifest no inclination to return to the habit. If none of these measures are beneficial it may be necessary to consult a veterinarian, who can correct the condition by means of surgery.

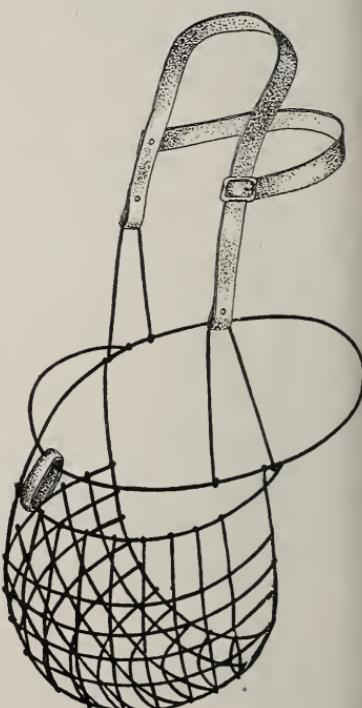


FIGURE 3.—Muzzle-basket type of calf weaner.

## DISEASES AND CONDITIONS AFFECTING THE UDDER

### MASTITIS (GARGET, CAKED UDDER)

Mastitis means inflammation of the udder. It is a widespread disease, particularly in dairy cattle, and is caused by the entrance of bacteria into the udder. The disease can, therefore, be carried or transmitted from diseased to healthy cows. The continued spread of mastitis in dairy herds results each year in an enormous loss to the dairyman. Milk from diseased cows does not contain the usual amounts of butterfat, milk sugar, and other elements present in milk from healthy udders. On the other hand, it may contain large numbers of bacteria, leucocytes (white blood cells), and other products resulting from the disease. Consequently, such milk is low in nutritive value and is rejected not infrequently because of high bacteria and leucocyte counts. In addition to losses from this source, cows affected with mastitis cannot produce the volume of milk of which they would be capable if their udders were healthy. This decrease in production, in many cases, may amount to as much as 25 percent or more, and necessitates early disposal of diseased animals as unprofit-

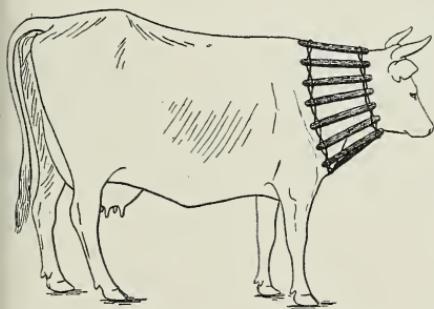


FIGURE 4.—A crib, or rigid collar, as applied to prevent a cow from sucking her udder.

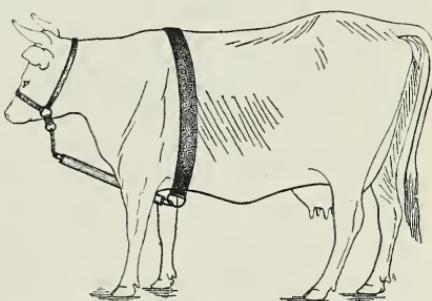


FIGURE 5.—Another form of antisucking apparatus.

able. Mastitis is, therefore, one of the chief causes for the heavy turnover in cattle in dairy herds.

Several kinds of bacteria are capable of producing mastitis when they have finally become established in the quarter or quarters of the udder. However, only a few are responsible for most cases of the disease. Among the varieties of bacteria occasionally found in cases of mastitis are several which may be harmful to man. At one time tuberculosis of the udder was a common cause of the disease. However, because of the progress made in the eradication of tuberculosis from cattle of this country, mastitis from this source is extremely rare. Other diseases, such as septic sore throat which may be caused by drinking raw milk, may result from contamination of the milk after it leaves the cow or to a case of mastitis. In either instance the infection is the result of contact with a diseased handler or milker. The presence of these bacteria can be recognized only by bacteriological examination of the milk. Fortunately the occurrence of these diseases is very infrequent. Most of the varieties of bacteria found in mastitis are harmless for the consumer and when milk is properly pasteurized, practically all danger is eliminated.

The bacteria that cause mastitis are usually carried from diseased cows to the teats of healthy cows on the hands of milkers or in the teat cups of milking machines during milking. The bacteria then enter the opening in the teat, pass up the teat canal, and establish themselves in the milk cistern or lower part of the quarter. From this point they spread slowly or rapidly, depending upon circumstances, to other parts of the organ. When disease-producing bacteria have thus become implanted in the udder, they remain there, as a rule, for the rest of the life of the animal.

As a result of the persistence of these bacteria in the udder, mastitis is a chronic disease in the majority of cases. Acute cases occur from time to time in individual animals, but for the most part they are flare-ups of already-established chronic cases and should be regarded as such in the management of the disease. Because of its nature, chronic mastitis runs a somewhat obscure course and as a consequence it may become widely disseminated through the herd before its presence is recognized. Similarly, many cows affected with chronic mastitis undoubtedly are purchased to replace animals which have been sold on account of the disease. This is due to the fact that the symptoms of the disease are not outstanding and are somewhat difficult to detect. Of the symptoms associated with the disease, changes in the milk, such as the presence of flakes or clots and a watery or unusual appearance, are most frequently observed. Other symptoms may be occasional slight swellings in the udder for a day or two, a more rapid decrease in milk production than is generally expected, the so-called short milker, persistent inflammation in the udder after calving and at the end of the lactation period, and frequent high bacterial counts in the milk. The decrease in milk secretion is caused by the continued irritant effect of the bacteria which leads to hardening of the glandular tissue of the affected quarter. The resulting changes appear in the form of hard circumscribed areas or diffuse hardening of the gland, which can be detected with some experience when the empty udder is manipulated.

Unlike the chronic form of the disease, acute mastitis is readily detectable and is the form most familiar to the cattle owner. The symptoms are quite characteristic. The affected part is hot, tense, very hard, and tender, and the animal moves with reluctance and some difficulty because of the soreness of the udder. Milk secretion is largely or entirely suspended, and what there is of it is lumpy or stringy and in some cases appears as a straw-colored fluid, occasionally tinged with blood, containing yellowish clots. Very frequently the secretion, during an attack at calving time, may contain blood from the rupture of a small blood vessel. When certain kinds of bacteria are involved in an acute attack the secretion may even be purulent and offensive. At times these common symptoms may be accompanied by a general systemic disturbance such as depression, rough coat, dull eyes, loss of appetite, suspended rumination, and possibly constipation. There may or may not be fever and, exceptionally, a dropsical condition under the skin of the abdomen.

The acute form of the disease can be caused by any factors which tend to aggravate the chronic mastitis already present, or in some cases it may result from a recent invasion of the udder by mastitis bacteria. Among the causes or combinations of causes capable of arousing the chronic condition or favoring bacterial invasion of the udder are:

Exposure to cold or wet weather; sudden changes of temperature; blows, kicks, bruises, or abrasions of the udder; wounds of the teats; feeding heavily for milk production; infrequent, irregular, or incomplete milking; introduction of contaminated foreign bodies such as tubes or pieces of straw into the teat canal; indigestion; or any systemic disturbance of the animal's health. Although this form of disease occurs most frequently at calving time and at the end of the lactation period, it may appear whenever any of these conditions are present. With appropriate treatment, the acute symptoms subside in many cases, and the udder resumes its usual appearance. The milk also appears normal although the yield may not return to its previous level. However, recovery from an acute attack is more apparent than real since the bacteria responsible for the mastitis are still present in the udder and are capable of producing further attacks under favorable conditions. Finally, acute mastitis may result at times in atrophy or drying up of the quarter, the formation of abscesses, or gangrene of the udder. When any of these conditions occur, a veterinarian should be consulted as to suitable treatment.

#### Diagnosis

Diagnosis of acute mastitis is readily made from the characteristic symptoms of the disease. Chronic mastitis, on the other hand, presents some difficulties in detection. Since detection of all diseased animals must of necessity be the first step in any program for controlling the spread of the disease, a number of methods designed for this purpose have been recommended. Some of these tests are applicable for use in the herd, while others can be carried out successfully only by a veterinarian or in the laboratory. Probably the most practical test for the dairyman is the strip cup. This is simply a tin cup covered with a fine wire screen or black cloth. Two or three streams of milk from each quarter are drawn onto the strainer immediately before the animal is milked. Any quarter in which abnormal milk or clots are found is affected with mastitis. However, these changes do not appear regularly in the milk of all cows having chronic mastitis. Consequently, repeated use of this test is necessary to detect every diseased animal. For greatest effectiveness, the strip cup should be used before each milking.

A second method which can be used in the dairy barn is the brom-thymol-blue or "thybromol" test. This procedure requires more equipment and a great deal more experience in its interpretation than the strip-cup test. The test is carried out either with a dye solution and test tubes or with papers impregnated with this solution. A definite quantity of milk from one quarter is added to a measured quantity of dye solution in a test tube, or a few drops of milk are placed on the paper containing the dye. The color resulting from this mixture depends upon the degree of acidity of the milk. Milk from healthy quarters gives a yellowish-green shade, whereas that from quarters affected with mastitis is predominantly green, or, in exceptional cases, a bright yellow. Although this test detects a somewhat larger number of diseased animals at any one time than the strip cup, it too should be used at frequent intervals to find every affected cow, although not necessarily at every milking. The changes in the milk

which these tests detect are the result of bacterial activity in the quarter, but they do not reveal the kind of bacteria present. Although mastitis bacteria remain in the udder at all times in most cases, such changes may not be detected regularly in the milk. Consequently, failure to find evidence of mastitis with these tests in cows previously shown to be diseased does not mean that these animals are no longer affected. Therefore, cows which have been found to have mastitis at any time should be handled as such for the purpose of controlling the disease as long as they remain in the herd.

#### Treatment

When properly handled, acute attacks of mastitis will subside fairly rapidly, and the animal will be restored to comparative usefulness although the underlying cause of the condition may remain unchanged. One of the most important points in the treatment of an acute attack of mastitis is frequent milking of the affected quarter or quarters. This should be done every hour or two until the secretion returns to normal and should be accompanied by gentle massage with downward pressure in order to work as much of the diseased material as possible into the milk cistern, from which it can be removed by gentle stripping. At the same time camphorated oil or a suitable ointment may be rubbed into the skin to facilitate the massage. The secretion should be collected in a bucket containing disinfectant and disposed of in such a manner that other animals cannot have access to it. At the beginning of the attack, applications of cold packs may assist in reducing the condition. If the affected part does not respond readily to this treatment it is advisable to change to applications as hot as the hand will stand until the inflammation has left the part. The ration should be changed to one consisting principally of roughage, with the concentrates such as cottonseed and linseed meal eliminated. No attempt should be made to force an antiseptic fluid into the quarter unless the operation is recommended and performed by a veterinarian.

There are no entirely effective measures available for the treatment and cure of all cases of chronic mastitis. Treatment is still largely in the experimental stage. The most suitable method of handling chronic mastitis when it has been found in the herd seems to be prevention of spread of the disease from affected to healthy cows by a program of sanitation and segregation rather than by an attempt to cure the diseased animals. Such a program consists in early detection of infected animals by a veterinarian and the use of approved sanitary measures.

When each animal has been examined and the condition of the udder determined, those animals which are found to have marked cases of mastitis should be removed from the herd and slaughtered. Such animals are of little or no value, and they are the chief sources from which infection spreads. The remaining animals should then be divided into three groups, the healthy cows in one, those which are suspected of having the disease in another, and finally animals which have slight cases of mastitis. Although these last cows have mastitis, they may be retained temporarily in the herd because the trouble has not progressed to the point where the milk is unfit for use and milk production has not decreased to an unprofitable point.

Following this division, it is desirable that cows of each group be stabled together and assigned permanent stalls. In this way a permanent order of milking can be established and followed with little difficulty. In case it is impractical to stable the three groups separately, at least the healthy group should be kept separate from the other two. Since the disease is spread during milking it follows that the healthy cows must be milked first each time, the ones suspected of having mastitis next, and those having the disease last. When first-calf heifers are added to the milking herd, they can be safely included in the healthy group unless definite evidence of mastitis is observed at the time of calving. When animals have freshened again after division of the herd, they should be put back in the same group, provided that they have not developed mastitis in the meantime. If they have become infected, they should be placed in the third group. When a milking animal (a cow which has had one or more calves) is obtained from another herd, it should be bought only after the udder has been examined, or subject to such examination after 60 to 90 days if it cannot be examined at the time of purchase. Such an animal should be kept isolated during this period. If the animal is found to be healthy, it is placed in the first group; otherwise it is rejected. Any member of the healthy or suspected group which develops mastitis must be immediately placed with the diseased animals. Such an animal can usually be recognized by the secretion of abnormal milk or changes in the udder.

Before milking, all udders should be thoroughly cleaned. A practical method is to cut small hand towels in half and place the pieces in a suitable chlorine solution (150 to 400 parts of chlorine per million parts of water). Chlorine solutions should be kept in porcelain, enamel, glass, wood, or granite-ware containers but never in galvanized iron, tin, or aluminum vessels. Remove a towel from the solution, wring out the excess fluid, and wipe the udder thoroughly, using a separate towel for each animal. This cleanses the skin and leaves it comparatively dry. After each milking the towels should be washed, boiled, and, if possible, dried in the sun. When a milking machine is used, the teat cups should be rinsed in a chlorine solution of the above strength before each cow is milked. If milking is done by hand, the milker should wash his hands in warm, soapy water or chlorine solution and dry them before milking the next animal. After milking, the teats of each animal should be dipped in fresh chlorine solution to disinfect the ends of the teats and remove any milk which remains on them. Between milkings the machine must be thoroughly cleaned and disinfected as described in Farmers' Bulletin 1315.

Inasmuch as any injuries to the udder cause it to be more easily attacked by mastitis bacteria, as much care as possible should be taken to prevent such injuries. This may be done, in part, by providing properly constructed stalls which allow adequate space for each cow, stall partitions to prevent cows from treading on one another's teats, and a well-bedded, dry floor. The generous use of lime or superphosphate in the stable helps to keep the floor dry.

If the foregoing procedures are strictly followed, there should be but little, if any, further spread of the disease to the healthy animals. Also there should be a reduction in the severity of the disease in the affected group. However, it must be emphasized that successful

operation of this disease-control measure depends entirely upon daily observance of all of the points mentioned. Finally, adequate veterinary supervision of the herd should be maintained at all times.

### COWPOX (VARIOLA, VACCINIA)

Cowpox is an acute, contagious disease accompanied with a slight fever and a typical eruption which is usually confined to the teats and udder of the female or the scrotum of the male. The lesions first appear as small, red papules or nodules which, after 1 or 2 days, resemble blisters and are filled with a clear fluid. The later stage is marked by the change in the character of this fluid to a puslike appearance and consistency. The final stage is that of the drying up of the pustules and the formation of scabs.

The disease may be introduced by recently vaccinated persons handling the animals or by the addition of infected animals to the herd. It is usually spread through milking and breaks out 3 to 6 days after exposure. Cowpox runs a mild course in many herds and may be totally lacking in serious consequences. On the other hand, severe mastitis may result from the occurrence of eruptions on the ends of the teats. This, in turn, if not properly managed, may lead to widespread udder trouble throughout the herd.

When the disease appears, affected animals should be promptly isolated and precautions taken to avoid carrying infection to other cows. The diseased animal should be milked last and the milk disinfected and then discarded so that other cattle cannot have access to it. In addition, all utensils which have been in contact with the animal must be washed and sterilized. After milking, antiseptic precautions should be observed which will protect the milker's hands from infection. Since cowpox may persist on the premises for some time, the stable and any other buildings in which cattle are kept should be thoroughly disinfected after the last case has disappeared. Uncomplicated cowpox usually runs its course in several weeks and is followed by recovery and immunity to further attack.

#### Treatment

The presence of sores on the udder and teats renders milking somewhat painful to the cow; consequently, this should be done gently and with as little discomfort to the animal as possible. Care of the diseased parts consists in keeping them clean and soft. Twice a day they should be bathed with 3-percent cresylic disinfectant and an antiseptic ointment applied. Badly affected cows or cows in advanced lactation, had best be dried off as an aid to healing the sores.

### CHAPPED TEATS

Chapped teats are caused by any irritation, such as sudden chilling after sucking by the calf, "wet milking" by the attendant, damp or filthy conditions in the stable, wet bedding, overstocking, exposure of tender skin to sun rays in summer, or freezing in winter. The skin is first rough and inclined to scale, and later wrinkles are formed, which may become hard and deep and presently break into raw fissures.

#### Treatment

Favorable conditions, such as dry quarters and bedding, cleanliness of the udder, and "dry milking" are essential. Wash the udder with warm soapy water, rinse and dry with a towel, and then paint the chapped surface (once a day) with compound tincture of benzoin, or a mixture of 1 part of tincture of iodine and 4 parts of glycerin. It may be advisable to anoint the teats with petrolatum before milking, so that the milk may be drawn with the least pain to the animal.

#### WARTS

Warts on the teats and udder form an annoying disfigurement as well as an obstacle to milking. While perhaps harmless themselves, they may lead to abrasions or fissures and thus expose the skin of the animal to the invasion of blowflies or screwworms, or infections.

#### Treatment

Long warts may be removed by twisting or tying a silk thread tightly about the base of the growth. The wart will eventually slough off.

Repeated applications of glacial acetic acid or other caustic to the body of the wart have been successfully used in the removal of such growths. Care must be observed, however, to restrict this treatment to the objectionable growth, as these chemicals are very injurious to healthy skin. As a precaution, the normal area around each wart may be previously coated with petrolatum or tallow. A safer treatment is to paint the warts with collodion containing salicylic acid. The simple application of castor oil at 2-day intervals is also said to be effective in killing warts.

Some warts require surgery for their removal. In such cases the attending veterinarian will perform the operation and prescribe the aftertreatment.

#### TUMORS

Tumors in the teat or milk cistern may be harmless growths or connective-tissue enlargements due to mastitis. As a rule these growths are better not interfered with unless they become so large as to obstruct the milk flow or otherwise inconvenience the cow. Sometimes they may be reduced by the persistent external application of tincture of iodine or an iodine ointment. If their surgical removal becomes necessary, it should be undertaken only by a veterinarian and not until the cow has been dried off. Under the most favorable circumstances, surgical treatment of the udder involves the danger of a serious infection of the organ.

Tumors within the body of the udder, and sometimes in the milk cistern, may be tuberculous. Such a suspicion may be dispelled only by the animal's failing to react to the tuberculin test, which should be applied by a veterinarian. A tuberculous growth in the udder is beyond remedy and constitutes a real menace to the health of persons and livestock. Seek veterinary advice.

### STRICTURE, OR HARD MILKING

Hard milking is due to an obstruction or stricture, sometimes within the milk duct, but usually at the teat orifice. It may be brought about by a tenseness of the teat orifice or by scar formation following an injury of the teat.

#### Treatment

There are on the market several types of teat dilators, any one of which may be of benefit in correcting this condition. The dilator may be inserted an hour or two before milking. To avoid carrying infection into the quarter the instrument must be sterile and the teat thoroughly cleansed before insertion. Because of the danger of carrying infection into the quarter, dilators should be used sparingly and as a last resort. After milking, the affected teat should be massaged with belladonna ointment. The alternate use of the ointment and the dilator should be continued until the condition appears to be corrected.

When this treatment fails, it may become expedient to resort to surgical measures for the relief of the stricture, but this is done to better advantage after the cow has been dried off, when there is a better prospect of prompt healing and less likelihood of causing a dangerous infection or a leaky teat.

### ATRESIA (BLIND, OR IMPERFORATE, TEATS)

Atresia is a defect existing from birth and is seldom, if ever, discovered until after the heifer has freshened. The owner's suspicion is first aroused when one or more quarters become abnormally large, hot, and painful, while the efforts of the calf to obtain nourishment therefrom are evidently unsuccessful. Examination usually reveals the fact that the teat orifice is wanting but there will be seen a distinct ring surrounding the slight depression where the teat orifice should be.

#### Treatment

Treatment is obviously surgical and calls for the services of a veterinarian.

To prevent closure by healing, it is advisable to insert a milk tube, with the usual precautions as to sterilization, at milking time, and to replace it between milkings with a sterile or medicated teat dilator.

Healing may be promoted by the application of an ointment of the balsam of Tolu, or of belladonna and glycerin. Should the opening become sealed during the healing process, it will become necessary to repeat the surgical operation.

### WOUNDS

Wounds of the udder may be caused by barbed-wire cuts, brier cuts, nail snags, long and jagged finger nails of milkers, bites of dogs, the trampling of teats under the hoofs of other cattle, high barn doorsills, fence jumping, and goring.

#### Treatment

Cleanse the wound and keep it clean. If the skin is laid open the underlying tissue should be thoroughly cleansed with a mild germicidal

solution, the hair should be shaved or clipped from around the injury, and the lips of the wound should be brought together and held in position by means of strips of adhesive tape. In case of gaping wounds where sutures are needed or where drainage should be provided on account of pus formation, the services of a veterinarian are advisable as a mistake in treating such cases may result in the infection of one or more quarters, with disastrous consequences.

#### LEAKY QUARTER AND FISTULA

When a heavy-milking cow comes up to the barn with milk dripping or streaming from one or more of her distended quarters, the animal should be milked three or even four times a day instead of twice. Cows of only moderate production may likewise leak milk at times if their milking is long delayed or their capacity of retention is otherwise abnormally taxed. Persistent loss of milk through teat leakage, however, is not only annoying but very unprofitable for the owner. In addition such cows are very frequently subject to chronic mastitis.

Chronic leaking is probably due in most cases to weakness of the teat orifice, to a fistula of the teat, or to the effects of a previous unsatisfactory operation for the relief of stricture or other teat obstruction.

Weakness of the teat orifice may be overcome sometimes by the local application of tincture of iodine or saturated alum solution twice a day. The common practice of stopping a leaky teat with a rubber band or tape, or inserting a plug between milkings, is inadvisable, as it only tends to aggravate the weakness of the part or to increase the size of the opening. The introduction of plugs or foreign bodies of any kind into the teat canal will almost invariably cause mastitis. Flexible collodion, into which has been incorporated 1 or 2 percent of iodine crystals, may be used to seal the teat orifice twice daily, or immediately after milking.

Teat fistula, due to injuries, constitutes a common and annoying form of teat leakage. Efforts to reduce a teat fistula, however, had better be postponed, if possible, until the milking period of the animal has been terminated. The procedure, which is a surgical one, consists in scarifying the edges of the fistulous opening, bringing the lips of the wound together, and suturing them into place to establish closure of the aperture by healing. This operation should be attempted only by a veterinarian, however, as skill and surgical cleanliness are absolutely necessary, while at best there always remains the danger of establishing a serious infection of the gland. The aftercare consists in bathing the wound several times daily with a mild antiseptic solution.

If a cow in full flow of milk should receive a barbed-wire cut or other injury to the teat which would probably develop into a fistula, the correct procedure is to have a veterinarian suture the wound immediately rather than to await the drying off of the animal and risk the consequences of a leaky quarter. The milking tube under these circumstances should always be inserted before attempting to draw milk from an injured teat.

Rudimentary extra teats should never be removed unless for a compelling reason, as such an operation is a very common cause of leaky quarters.

### BAD FLAVORS AND ODORS OF MILK

Bad flavors and odors of milk may be due to disinfectants, feed, or bacterial contamination. Milk may acquire obnoxious flavors when volatile disinfectants such as cresylic disinfectant are used in the stable. This can be avoided by the use of nonvolatile disinfectants. The feed flavors may be due to the nature of the feed or to the time of feeding. Cattle on impoverished pasture may yield bitter milk as a result of consuming quantities of some weed. In case the milk of all the cows is off flavor, the probability is that the feed is the cause, and the condition can be corrected by either changing the feed or time of feeding.

Bacterial contamination causing off flavors and odors may come from utensils, feed, water, or udder conditions. A salty flavor in the milk is always present in severe cases of mastitis. If the cause is an udder condition, the animal should be removed from the herd and treated for the trouble. If contamination is caused by utensils, feed, or water, such causes should be removed and all utensils thoroughly cleaned and disinfected or sterilized.<sup>2</sup>

### BLOODY MILK

Bloody milk is a symptom of any of the following conditions: Mastitis, mechanical injury to the udder, or tuberculous infection of the udder. The operation of milking also may aggravate a tendency to hemorrhage if the udder is injured or inflamed.

Treatment consists in determining the cause, if possible, and in applying the remedial measures found elsewhere in this bulletin. The application of the following general treatment may be sufficient to afford relief in mild cases:

Milk out the udder completely at least four times a day, at regular intervals; bathe the udder with cold water, then dry and apply camphorated oil to the quarter with gentle massage; avoid an excessively rich diet; encourage the animal to utilize as bulky a ration as is consistent with her milk production; administer an occasional dose of Epsom salts (about 1 pound) as needed; also a half ounce of saltpeter once a day. Should the hemorrhage persist, the advice of a veterinarian should be obtained.

Redness of milk which does not appear until several hours after milking is probably due to contamination of the milk with some one of the chromogenic (color-producing) bacteria. Thorough sterilization of utensils and proper care and cleanliness in handling the milk should effectively prevent this occurrence.<sup>2</sup>

### ROPY MILK

Milk is sometimes rosy, stringy, or slimy. What is known as "ropy milk" is due to bacterial infection after the milk is drawn. To eliminate this condition the cause should be found and removed and all utensils cleaned and sterilized to prevent further contamination.

At times stringy or slimy milk is procured from the udder and is usually caused by either injury or mastitis. Such milk should be boiled or treated with a disinfectant to kill any bacteria present and then discarded. Likewise the utensils into which the milk is drawn should be thoroughly cleaned and disinfected or sterilized. The animals should also be treated.

<sup>2</sup> See Farmers' Bulletin 1675, Care of Milk Utensils on the Farm.

**MILKSTONE, OR CALCULUS**

Milkstone or calculus, is a term loosely applied to concretions in the udder. Some stones are formed by coagulated casein and may be an indirect result of udder inflammation, while others are simply accumulations of lime salts from the milk which may sometimes be distinguished by the occasional discovery of gritty particles in the bottom of the milk pail or on the strainer cloth.

**Treatment**

After a prolonged, gentle massaging of the teat extremity with a belladonna ointment, the concretions, if not very large, may be passed with the aid of a sterile spring teat dilator. In case the stones cannot be removed in this way it may be necessary to remove them by means of an opening in the side of the teat. These operations should not be undertaken by the inexperienced layman, as the danger of seriously infecting the udder by insanitary procedure cannot be overestimated, as well as the extreme likelihood of leaving a fistulous, leaky teat. Unless the concretions are sufficiently large to constitute an obstruction, their surgical removal, even by a veterinarian, had far better be postponed until the cow has been dried off.

**AGALACTIA, OR SUPPRESSION OF MILK**

The disease known as agalactia, or suppression of milk, is not infectious in cattle, as it is in sheep and goats. Neither is it so common. Occurring, as it usually does, at calving time, agalactia seems to be influenced by such predisposing causes as indigestion, loss of appetite, mastitis, insufficient or unsuitable feed, plant poisoning, severe insect stings on the udder, thirst, enforced driving, fear or excitement, or the removal of the calf. Incidentally, agalactia is a symptom often seen in rabies in the cow.

**Treatment**

The animal, if a heifer, should first be examined for the possibility of atresia, or imperforation of the teats. This possibility eliminated, the attention should be directed toward determining, if possible, the contributing cause or causes, which should receive prompt attention.

The animal should be kept quiet and surrounded with an environment most conducive to her comfort and complete satisfaction. She should be supplied with an abundance of fresh, clean, drinking water and have a generous allowance of a ration calculated to stimulate milk secretion, preferably a warm mash. Milk secretion may be assisted by internal medicinal treatment. Massaging the udder with lard or a stimulating ointment may assist in bringing her to her milk. Efforts should be made to milk her twice a day at regular milking time even though the efforts are unrewarded. If the calf is brought to her side shortly before milking time, this additional appeal to her maternal instinct may exert a favorable influence.

**MILK FEVER, OR PARTURIENT APOPLEXY**

The condition known as milk fever occurs, as a rule, immediately after calving and usually appears in the best producing cows in the herd at the time when they have reached their full production of milk, between the ages of 5 and 9 years. It is characterized by its

sudden appearance and acute course. The animal becomes paralyzed and passes into a semiconscious or unconscious condition which may terminate in death. The exact reasons why this condition develops in some cows and not in others are not definitely known. However, it is known that as a result of the onset of the disease there is a marked fall in the calcium or lime content of the blood and that by increasing the amount of calcium circulating in the blood a cure can be effected. Apparently such factors as heavy milk production, excessive feeding, and lack of exercise predispose the animal to such an attack.

The symptoms of milk fever are characteristic and easily recognized. Soon after, or in a few cases immediately before calving, the cow may show signs of excitement and anxiety, followed by constipation and colicky symptoms. The owner may notice a staggering gait and weakness, especially of the hindquarters. Eventually the cow, no longer able to maintain the standing position, goes down and



FIGURE 6.—Characteristic attitude of a cow with milk fever.

assumes the posture so characteristic of this disease (fig. 6), with the hind legs extended forward and the head thrown back toward the flank. A comatose condition follows, during which there is danger in attempting to administer medicine by the mouth as the throat muscles are temporarily paralyzed and the material may pass into the windpipe and lungs and cause pneumonia. Pulse and respiration are weak, and the temperature is more frequently subnormal than otherwise. Unless prompt remedial measures are undertaken, death will follow within 3 days. Although the symptoms given are found in a majority of milk fever cases, an occasional case may occur in which the usual symptoms are missing, and in addition the case may be complicated by the presence of other conditions. Veterinary advice should be obtained, therefore, in all cases of milk fever.

#### Treatment

Two methods of treatment are available and appear to be equally efficient. They both accomplish the same purpose—the restoration of calcium to the blood. The newer method consists in administering calcium salts dissolved in sterile water, to the animal either by way of a vein or under the skin. Either calcium gluconate or calcium

chloride may be used, but the former is preferable, especially for injection under the skin as it is much less irritating and less apt to cause abscess formation and sloughing. As the dosage of either of these salts depends upon the method of administration and also upon the size of the animal, the remedy should be given only by a veterinarian. In some cases it may be necessary to repeat the treatment a second and even a third time before permanent recovery is attained. The principal advantage of this method is that no manipulation of the teats and udder is necessary, and consequently there is no danger of introducing infection into the quarters and thus causing mastitis.

The other method of treatment consists in inflating the quarters of the udder with sterile air and tying the teats with broad tapes. The udder is allowed to remain inflated for several hours after the cow has regained her feet. The treatment must be performed with the utmost regard to cleanliness. A clean cloth should be laid beneath the udder,

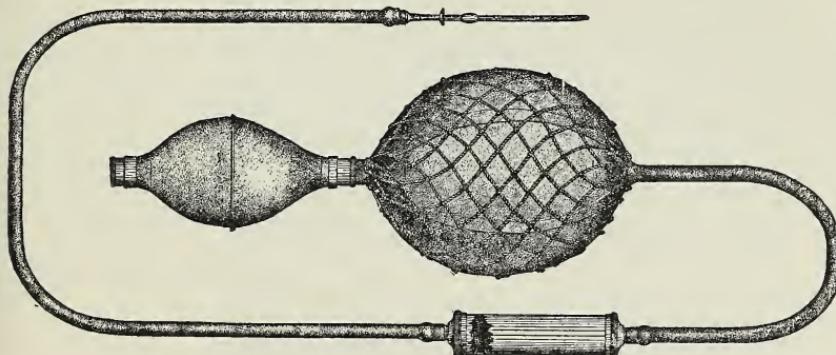


FIGURE 7.—Apparatus used in treatment of milk fever for injecting sterile air into the udder.

which is then washed clean and disinfected with 5-percent carbolic acid solution.

The apparatus used for inflating the udder (fig. 7) consists of a rubber-bellows arrangement attached to a rubber tubing, which in turn is connected with a hollow metal cylinder containing sterile cotton for the filtration of air. Another rubber tube is attached to the other end of the metal cylinder, and at the other end of this rubber tube is the metal teat catheter. The last tube and metal catheter should be thoroughly sterilized by boiling, and the hollow metal cylinder should be loosely packed with sterile cotton.

The catheter is then inserted into one of the teats of the previously cleaned udder, and the rubber bulb is operated by repeated compressions until the quarter is well inflated. Massage of the quarter during inflation will assist in filling the recesses of the gland with sterile air. The catheter is then withdrawn and the teat tied with broad tape. After inflating all four of the quarters the veterinarian will have an opportunity to attend to any complications or to administer stimulants if necessary. Medicinal treatment is usually superfluous, however, in uncomplicated cases of milk fever. Following the sterile-air treatment alone, it is no uncommon experience to find the cow on her feet in from 30 to 60 minutes and eating as though there had been no disturbance of her normal condition.

Should the first sterile-air treatment fail to give relief, the procedure should be repeated, as the air previously injected may have escaped or been absorbed. The tapes may be removed in about 5 hours, or soon after the cow regains her feet. The air should remain in the udder for about 24 hours, after which time it should be completely extracted by the manipulation used in milking. It is then safe to permit the calf to suck. An occasional case of milk fever is found which fails to respond to this method but is immediately relieved by the use of the calcium salts. On the other hand, a few cases are not benefited by the injection of these agents but do very well following the inflation of the udder.

#### Prevention

Although it is impossible to foretell which animals may suffer from milk fever at the time of calving, there are some general measures which may be used that are believed to be of assistance in warding off such an attack. When the cow is dried off prior to calving she should be placed on a light ration of bran and a little ground oats, supplemented with suitable hay and possibly some succulent roots or an occasional feed of silage or beet pulp. She should be housed in a dry, comfortable, well-ventilated stable with sanitary surroundings, properly bedded, and given sufficient and regular exercise daily up to the time of calving. Several days prior to calving she should receive a full dose of Epsom salts. Cows which are known to have had milk fever at previous calvings may be given a dose of calcium salts, in the manner previously described, immediately before calving as a possible precautionary measure.